Appl. No. 09/940,818

IN THE CLAIMS

1. (Currently Amended) A method of measuring, in a ~~lithographic manufacturing process using~~ a lithographic projection apparatus **having an alignment-measuring device**, the overlay between a resist layer, in which a mask pattern is to be imaged, and a substrate, ~~in which method use is made of~~ **having** at least one substrate overlay mark having a periodic structure with a period p_1 and a corresponding resist overlay mark having a periodic structure with a period p_2,

wherein measuring the overlay comprises measuring an interference pattern with the alignment-measuring device of the lithographic projection apparatus, the alignment-measuring device adapted to measure the alignment of a substrate alignment mark having a periodic structure with a period p_s, with respect to a reference mark having a periodic structure with a period p_r, the interference pattern having a period p_b being generated by illuminating the substrate overlay mark and the resist overlay mark, where p_s is substantially larger than the periods p_1 and p_2, p_r is adapted to p_s, and p_b is adapted to p_r.

~~characterized in that use is made of alignment measuring device, forming part of the apparatus and intended for measuring the alignment of a substrate alignment mark having a periodic structure with a period p_s which is substantially larger than the periods p_1 and p_2, with respect to a reference mark having a periodic structure with a period p_r, adapted to the period p_s, and in that an interference pattern, which is generated upon illumination of the substrate overlay mark and the resist overlay mark and has a period p_b, adapted to the period p_r, is imaged on said reference mark by means of alignment beam radiation.~~

2. (Previously Presented) A method as claimed in claim 1, characterized in that use

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is made of a substrate reference mark having substantially the same period as the interference pattern, the substrate reference mark is imaged on the reference mark, and the difference between the positions of the image of the interference pattern and that of the substrate reference mark with respect to the reference mark is determined.

3. (Previously Presented) A method as claimed in claim 1, characterized in that use is made of gratings for the substrate overlay mark, and the resist overlay mark and the reference mark.

4. (Previously Presented) A method as claimed in claim 1, characterized in that the resist overlay mark is a latent mark.

5. (Currently Amended) A method as claimed in claim 1, ~~characterized in that an on-axis~~ **wherein the** alignment-measuring device is **an on-axis alignment-measuring device,** ~~used~~ and ~~in that~~ the reference mark is a mask alignment mark.

6. (Previously Presented) A method as claimed in claim 5, characterized in that the interference pattern is imaged on a mask alignment mark via an optical filter, which selects diffraction orders of the radiation from the overlay marks to proceed to said mask alignment mark.

7. (Currently Amended) A method as claimed in claim 1, **wherein the alignment-measuring device is an off-axis alignment-measuring device** ~~characterized in that an off-axis alignment device is used~~.

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8. (Currently Amended) A method of manufacturing devices in at least one layer of substrates, ~~which method comprises at least one set of the following successive steps~~ **comprising**:

[[-]] aligning, **by means of an alignment measuring apparatus with an exposure system,** a mask provided with at least one overlay mark with respect to a first substrate;

[[-]] imaging, by means of projection radiation, the overlay mark **of the mask,** in a resist layer on the substrate, **to form an overlay mark in the resist layer** ;

[[-]] determining ~~the~~ **an** overlay **error** between the overlay mark formed in the resist layer and an overlay mark in the substrate, and **adjusting the exposure system to** correcting **the** overlay errors;

[[-]] imaging, by means of projection radiation, a mask pattern comprising pattern features corresponding to device features to be configured in said layer in a resist layer on each substrate wherein the device features are to be formed, and

[[-]] removing material from, or adding material to, areas of said layer, which areas are delineated by the mask pattern image; ~~, characterized in that the overlay is determined by means of the method as claimed in claim~~

wherein determining the overlay comprises measuring an interference pattern with the alignment-measuring device of the exposure system, the alignment-measuring device adapted to measure the alignment of a substrate alignment mark having a periodic structure with a period p_s, with respect to a reference mark having a periodic structure with a period p_r, the interference pattern being generated by illuminating a substrate overlay mark having a periodic structure with a period p_1 and a corresponding resist overlay mark

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having a period structure with a period p_2, where p_6 is substantially larger that the periods p_1 and p_2.

9. (New) The method of Claim 8, wherein the exposure system is a stepping apparatus.

10. (New) The method of Claim 8, wherein the exposure system is a step-and-scan apparatus.

11. (New) The method of Claim 8, wherein the substrate overlay mark, the resist overlay mark, and the reference mark each comprise gratings.

12. (New) The method of Claim 11, wherein the substrate alignment mark comprises a grating.

13. (New) The method of Claim 8, wherein the alignment-measuring device is an on-axis device, the reference mark is a mask alignment mark, and the interference pattern is imaged on the mask alignment mark via an optical filter, which selects diffraction orders of the radiation from the overlay marks to proceed to the mask alignment mark.

14. (New) The method of 13, wherein the resist overlay mark is a latent mark.

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